

**IN THE SPECIFICATION:**

Kindly replace the paragraph beginning on page 5, line 17, with the following:

According to a first aspect of the present invention a method is provided to perform low-density parity-check code encoding of user data  $u$  of length  $N_u$ , by inserting parity data  $p$  of length  $N_p$  into output data  $c$  of length  $N$  in accordance with a parity matrix  $H$  such that  $H \bullet c = 0$ , comprising the steps of: (a) receiving the user data of block length  $N_u$ ; (b) decomposing  $H \bullet c$  into a first component  $H_u \bullet u$  corresponding to the user data and a second component  $H_p \bullet p$  corresponding to the parity data such that  $H \bullet c = H_u \bullet u + H_p \bullet p = 0$ ; (c) calculating a vector  $\underline{u} = H_u \bullet u$ ; and (d) calculating  $p = H_u^{-1} \bullet \underline{u}$   $p = H_p^{-1} \bullet \underline{u}$ .

Kindly replace the paragraph beginning on page 6, line 7, with the following:

According to an eighth aspect of the present invention, a low-density parity-check code encoder is provided to encode user data  $u$  of length  $N_u$ , by inserting parity data  $p$  of length  $N_p$  into output data  $c$  of length  $N$  in accordance with a parity matrix  $H$  such that  $H \bullet c = 0$ . An input inputs the user data of block length  $N_u$ , an  $H \bullet c$  decomposer decomposes  $H \bullet c$  into a first component  $H_u \bullet u$  corresponding to the user data and a second component  $H_p \bullet p$  corresponding to the parity data such that  $H_u \bullet u + H_p \bullet p = 0$ . A  $\underline{u}$  calculator to calculate a vector  $\underline{u} = H_u \bullet u$ , and a  $p = \underline{P} \underline{u}$  calculator to calculate  $p = H_u^{-1} \bullet \underline{u}$   $p = H_p^{-1} \bullet \underline{u}$ .

Kindly replace the paragraph beginning on page 6, line 24, with the following:

According to a thirteenth aspect of the present invention, the  $\underline{u}$  calculator calculates the vector  $\underline{u} = H_u \bullet u$  prior to the  $p = \underline{P} \underline{u}$  calculator calculating  $p = H_u^{-1} \bullet \underline{u}$   $p = H_p^{-1} \bullet \underline{u}$ .

Kindly replace the paragraph beginning on page 6, line 26, with the following:

According to a fourteenth aspect of the present invention, a computer program is provided to perform low-density parity-check code encoding of user data  $u$  of length  $N_u$ , by inserting parity data  $p$  of length  $N_p$  into output data  $c$  of length  $N$  in accordance with a parity matrix  $H$  such that  $H \bullet c = 0$ , comprising the steps of (a) receiving the user data of block length  $N_u$ ; (b) decomposing  $H \bullet c$  into a first component  $H_u \bullet u$  corresponding to the user data and a second component  $H_p \bullet p$  corresponding to the parity data such that  $H_u \bullet u + H_p \bullet p = 0$ ; (c) calculating a vector  $\underline{u} = H_u \bullet u$ ; and (d) calculating  $\underline{p} = H_u^{-1} \bullet \underline{u}$   $p = H_p^{-1} \bullet \underline{u}$ .

Kindly replace the paragraph beginning on page 7, line 3, with the following:

According to a fifteenth aspect of the present invention, 22, a data transmission system is provided for transmitting user data to and receiving data from a communication channel. A low-density parity-check code encoder encodes the user data  $u$  of length  $N_u$ , by inserting parity data  $p$  of length  $N_p$  into output data  $c$  of length  $N$  in accordance with a parity matrix  $H$  such that  $H \bullet c = 0$ . The encoder comprises an input to input the user data of block length  $N_u$ ; and  $H$   $c$  decomposer to decompose  $H \bullet c$  into a first component  $H_u \bullet u$  corresponding to the user data and a second component  $H_p \bullet p$  corresponding to the parity data such that  $H_u \bullet u + H_p \bullet p = 0$ ; a  $\underline{u}$  calculator to calculate a vector  $\underline{u} = H_u \bullet u$ ; and a  $\underline{p} = \underline{P} \underline{u}$  calculator to calculate  $\underline{p} = H_u^{-1} \bullet \underline{u}$   $p = H_p^{-1} \bullet \underline{u}$ . A transmitter transmits an output of the low-density parity-check code encoder to the communication channel. A soft channel decoder decodes data from the communication channel, and a soft low-density parity-check code decoder decodes data decoded by the soft channel decoder.

Kindly replace the paragraph beginning on page 7, line 16, with the following:

According to a sixteenth aspect of the present invention, a low-density parity-check code encoder encodes user data  $u$  of length  $N_u$ , by inserting parity data  $p$  of length  $N_p$  into output data  $c$  of length  $N$  in accordance with a parity matrix  $H$  such that  $H \bullet c = 0$ . An input means is provided for inputting the user data of block length  $N_u$ , and an  $H \bullet c$  decomposer means decomposes  $H \bullet c$  into a first component  $H_u \bullet u$  corresponding to the user data and a second component  $H_p \bullet p$  corresponding to the parity data such that  $H_u \bullet u + H_p \bullet p = 0$ . A  $\underline{u}$  calculating means for calculating a vector  $\underline{u} = H_u^{-1} \bullet \underline{p}$ , and a  $\underline{p} = \underline{P} \underline{u}$  calculating means for calculating  $\underline{p} = H_p^{-1} \bullet \underline{u}$ .

Kindly replace the paragraph beginning on page 8, line 1, with the following:

According to a twenty-first aspect of the present invention, the  $\underline{u}$  calculating means calculates the vector  $\underline{u} = H_u^{-1} \bullet \underline{p}$  prior to the  $\underline{p} = \underline{P} \underline{u}$  calculating means calculating  $\underline{p} = H_p^{-1} \bullet \underline{u}$ .

Kindly replace the paragraph beginning on page 8, line 4, with the following:

According to a twenty-second aspect of the present invention, a data transmission system is provided for transmitting user data to and receiving data from a communication channel. A low-density parity-check code encoding means encodes user data  $u$  of length  $N_u$ , by inserting parity data  $p$  of length  $N_p$  into output data  $c$  of length  $N$  in accordance with a parity matrix  $H$  such that  $H \bullet c = 0$ , comprising, and an input means inputs the user data of block length  $N_u$ . An  $H \bullet c$  decomposer means is provided for decomposing  $H \bullet c$  into a first component  $H_u \bullet u$  corresponding to the user data and a second component  $H_p \bullet p$  corresponding to the parity data such that  $H_u \bullet u + H_p \bullet p = 0$ . A  $\underline{u}$  calculating means

calculates a vector  $\underline{u} = \mathbf{H}_u \bullet \mathbf{u}$ , and a  $\underline{p} = \mathbf{P} \underline{u}$  calculating means for ~~calculates~~ calculating  
 ~~$\underline{p} = \mathbf{H}_u^{-1} \bullet \underline{u}$~~   $\underline{p} = \mathbf{H}_p^{-1} \bullet \underline{u}$ . A transmitter means transmits an output of the low-density parity-  
check code encoding means to the communication channel. A soft channel decoding means  
decodes data from the communication channel, and a soft low-density parity-check code  
decoding means decodes data decoded by the soft channel decoding means.

Kindly replace the paragraph beginning on page 27, line 2, with the following:

The present invention directed to a method and apparatus to perform low-density  
parity-check code encoding of user data  $\mathbf{u}$  of length  $N_u$ , by inserting parity data  $\mathbf{p}$  of length  $N_p$   
into output data  $\mathbf{c}$  of length  $N$  in accordance with a parity matrix  $\mathbf{H}$  such that  $\mathbf{H} \bullet \mathbf{c} = 0$ ,  
comprising the steps of: (a) receiving the user data of block length  $N_u$ ; (b) decomposing  $\mathbf{H} \bullet \mathbf{c}$   
into a first component  $\mathbf{H}_u \bullet \mathbf{u}$  corresponding to the user data and a second component  $\mathbf{H}_p \bullet \mathbf{p}$   
corresponding to the parity data such that  $\mathbf{H}_u \bullet \mathbf{u} + \mathbf{H}_p \bullet \mathbf{p} = 0$ ; (c) calculating a vector  $\underline{u} = \mathbf{H}_u \bullet \mathbf{u}$ ;  
and (d) calculating  ~~$\underline{p} = \mathbf{H}_u^{-1} \bullet \underline{u}$~~   $\underline{p} = \mathbf{H}_p^{-1} \bullet \underline{u}$ .